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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/550,846

04/17/2007

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33197

7590

01/06/2010

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EXAMINER

FORDE, DELMA ROSA

ART UNIT

PAPER NUMBER

2828

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,846	Applicant(s) CALVEZ ET AL.	
	Examiner DELMA R. FORDE	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,8-10,12-14 and 16-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8-10,12-14,16-23 and 25-37 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

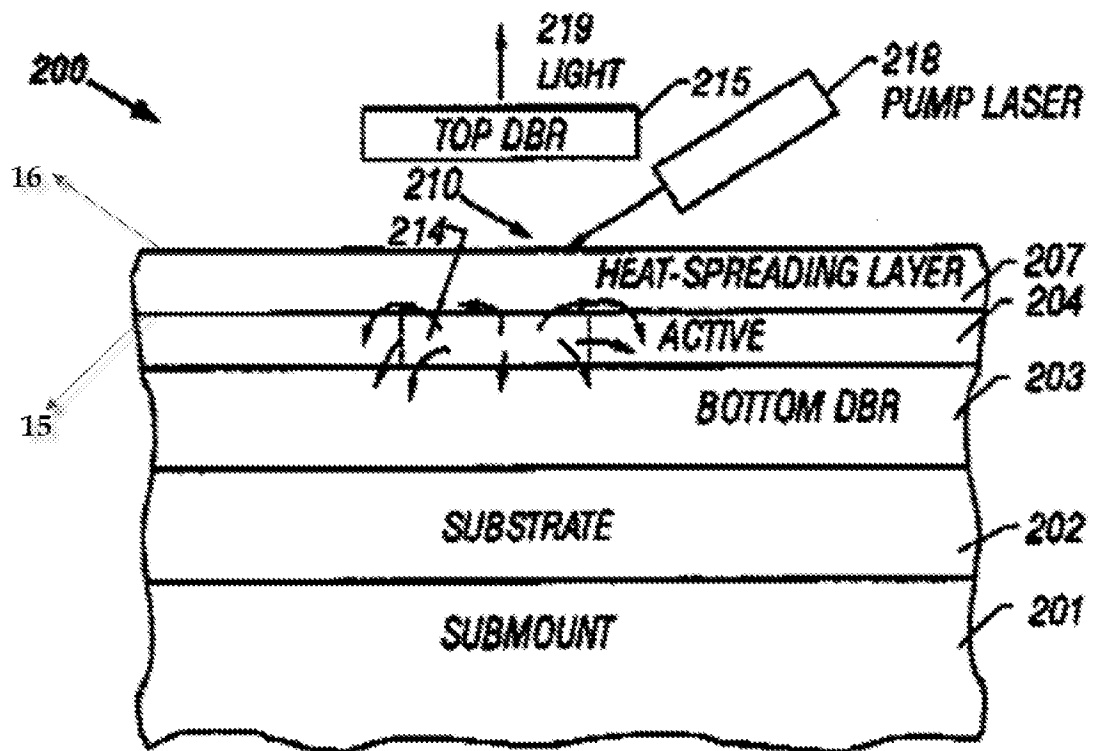
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 9-10, 12-14, 16, 18-23, 35-30 and 32 - 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng (2003/0039284) in view of Bewley et al (6,448,642).

Regarding claims 1 and 33 – 37, Zheng discloses a vertical-cavity device comprising: (a) a chip (see Figure 2, Character 200) comprising an active semiconductor layer (see Figure 2, Character 204) configured to provide optical gain; (b) a first mirror (see Figure 2, Character 203) arranged on a first side of the active layer (see Figure 2, Character 204); (c) a second mirror (see Figure 2, Character 215) arranged on a second side of the active layer (see Figure 2, Character 204), opposite to the first mirror (see Figure 2, Character 203), and forming with at least the first mirror (see Figure 2, Character 203) an optically resonant cavity that passes through the active layer in a direction out of the plane

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of the active layer (see Figure 2, Character 204, Paragraphs [0002, 0009]); and(d) a heat spreader (see Figure 2, Character 207) for removing heat from the active layer (see Figure 2, Character 204 and Paragraphs [0029, 0037- 0038]), the heat spreader (see Figure 2, Character 207) being arranged inside the cavity and having a first surface (see Figure 2, Character 15) adjacent to the chip and a second surface (see Figure 2, Character 16) opposite to the first surface, the heat spreader being transparent to light of wavelengths in an operating bandwidth of the device (Paragraph [0037]); optical function on light output from the device (Paragraph [0039]) (see Paragraphs [0026, 0032, 0037 – 0041, 0059 and 0063 – 0065]).



The examiner modified the drawing to be clearer in the rejection.

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Zheng discloses the claimed invention except for second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface or convex curved surface or truncated wedge-shape. Bewley teaches second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface or convex curved surface or truncated wedge-shape. However, it is well known in the art to apply the second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface or convex curved surface or truncated wedge-shape as discloses by Bewley in Figure 8, Column 6, Lines 64 – 67 and Column 7, Lines 1 – 8. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface or convex curved surface or truncated wedge-shape as suggested by Bewley to the laser of Zheng, because it the heat sink of the convex type as a heat radiator is exposed to improve the heat radiation property and reliability of the device.

Regarding claims 9 – 10, Zheng discloses the heatspreader (see Figure 2, Character 207) focuses or defocuses the output light, the heatspreader (see Figure 2, Character 207) focuses pump light (see Figure 2, Character 218) into the active layer (see Figure 2, Character 204) and the selected optical function is on light generated in the active semiconductor layer at a fundamental frequency

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of the device (see Paragraphs [0026, 0032, 0037 – 0041, 0059 and 0063 – 0065]).

Regarding claim 12 and 14, Zheng discloses the claimed invention except for the heat spreader has a refractive index that has been selected to provide substantially no refractive index step at the first surface and to provide a refractive index step at the first surface. It would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known heat spreader has a refractive index that has been selected to provide substantially no refractive index step at the first surface and to provide a refractive index step at the first surface as suggested by Zheng to the VCSEL, because two common properties of glass and other transparent materials are directly related to their refractive index. First, light rays change direction when they cross the interface from air to the material, an effect that is used in lenses or glass or other transparent materials. Second, light reflects partially from surfaces that have a refractive index different from that of their surroundings and to vary as the light passes through it.

Regarding claim 13, Zheng discloses the claimed invention except for reflectance at the first surface of the heat spreader is less than 5%. It would have been obvious to one having ordinary skill in the art at the time the invention was made to reflectance more than 5% at the surface of the heat spreader, since it has been held that where the general conditions of a claim is disclosed in the

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prior art, discovering the optimum or workable ranges involve only routine skill in the art. *In re Aller*, 105 USPQ 233.

In addition, the selection of reflectance at the first surface of the heat spreader, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In *re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed [reflectance at the first surface of the heat spreader is less than 5%] or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen [reflectance at the first surface of the heat spreader is less than 5%] or upon another variable recited in a claim, the Applicant must show that the chosen [reflectance at the first surface of the heat spreader is less than 5%] are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claims 16 and 26 – 28, Zheng discloses the claimed invention except for second surface of the heat spreader is curved or includes a curves structure and the heat spreader has a shape selected to provide control of a spatial mode of the output light. Bewley teaches second surface of the heat spreader is curved or includes a curves structure and the heat spreader has a shape selected to provide control of a spatial mode of the output light. However, it is well known in the art to apply the for second surface of the heat spreader is curved or includes a curves structure and the heat spreader has a shape selected to provide control of a spatial mode of the output light by Bewley in Figure 8, Column 6, Lines 64 – 67 and Column 7, Lines 1 – 8. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known for second surface of the heat spreader is curved or includes a curves structure and the heat spreader has a shape selected to provide control of a spatial mode of the output light as suggested by Bewley to the laser of Zheng, because it the heat sink of the convex type as a heat radiator is exposed to improve the heat radiation property and reliability of the device.

Regarding claim 18, Zheng discloses the second mirror is flat (see Figure 2, Character 215).

Regarding claim 19, Zheng discloses a second mirror is a MEMS mirror (Paragraph [0039], applicant don't explicitly said MEMS, but the applicant

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definition on PGPub 2008/0043798) said MEMS is a mirror could be used for fine tuning application and the reference use a mirror for reduce tuning).

Regarding claims 20, 21 and 22, Zheng discloses a second surface of the heat spreader has a dielectric coating, the dielectric coating is an anti-reflection coating and the dielectric coating is a mirror coating and forms the second mirror (Paragraph [0061], the reference discloses a heat-spreading could be made of different materials e.g. diamond and diamond is a dielectric material, the examiner believe that include a dielectric coating, anti-reflection coating, etc.).

Regarding claim 23, Zheng discloses the claimed invention except for heat spreader has a thickness of less than 1.5mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to the heat spreader can be more than 1.5, also thick enough to remove a not-insubstantial amount of heat from active region, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In addition, the selection of thickness of heat spreader, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges

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achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum a range within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed [heat spreader has a thickness of less than 1.5mm] or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen [heat spreader has a thickness of less than 1.5mm] or upon another variable recited in a claim, the Applicant must show that the chosen [heat spreader has a thickness of less than 1.5mm] are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claims 25 and 29, Zheng discloses a method of manufacturing a vertical-cavity device comprising: (a) fabricating a chip (see Figure 2, Character 200) comprising an active semiconductor layer (see Figure 2, Character 204) for providing configured to provide optical gain; (b) providing a first mirror (see Figure 2, Character 203) arranged on a first side of the active layer (see Figure 2, Character 204); (c) providing a second mirror (see Figure 2,

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Character 215) arranged on a second side of the active layer (see Figure 2, Character 204), opposite to the first mirror (see Figure 2, Character 203), and forming with at least the first mirror (see Figure 2, Character 203) an optically resonant cavity that passes through the active layer in a direction out of the plane of the active layer (see Figure 2, Character 204, Paragraphs [0002, 0009]); and (d) providing in the cavity a heat spreader (see Figure 2, Character 207) for removing heat from the active layer (see Figure 2, Character 204 and Paragraphs [0029, 0037- 0038]), the heat spreader (see Figure 2, Character 207) being arranged inside the cavity and having a first surface (see Figure 2, Character 15) adjacent to the chip and a second surface (see Figure 2, Character 16) opposite to the first surface, the heat spreader being transparent to light of wavelengths in an operating bandwidth of the device (Paragraph [0037]); (e) selecting at least one property of the heat spreader to have a selected optical effect on the output light (see Paragraph [0039]), in addition to the effect of removing heat from the active region (see Paragraphs [0026, 0032, 0037 – 0041, 0059 and 0063 – 0065]).

Zheng discloses the claimed invention except for second surface of the heatspreader is curved or includes a curved structure. Bewley teaches second surface of the heatspreader is curved or includes a curved structure. However, it is well known in the art to apply the second surface of the heatspreader is curved or includes a curved structure as discloses by Bewley in Figure 8, Column 6, Lines 64 – 67 and Column 7, Lines 1 – 8. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply

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the well known second surface of the heatspreader is curved or includes a curved structure as suggested by Bewley to the laser of Zheng, because it the heat sink of the convex type as a heat radiator is exposed to improve the heat radiation property and reliability of the device.

Regarding claim 30, Zheng discloses a source of pump light (see Figure 2, Character 218, the reference call “pump laser”).

Regarding claim 32, Zheng discloses a vertical cavity device comprising:(a) a chip (see Figure 2, Character 200) comprising an active semiconductor layer (see Figure 2, Character 204) for providing optical gain; (b) a first mirror (see Figure 2, Character 203) arranged on a first side of the active layer (see Figure 2, Character 204) suitable for forming with at least a second mirror arranged (see Figure , Character) on a second side of the active layer (see Figure 2, Character 204), opposite to the first mirror (see Figure 2, Character 203), an optically resonant cavity that passes through the active layer in a direction out of the plane of the active layer (see Figure 2, Character 204, Paragraphs [0002, 0009]; and (c) a heat spreader (see Figure 2, Character 207) for removing heat from the active layer (see Figure 2, Character 204 and Paragraphs [0029, 0037- 0038]), having a first surface (see Figure 2, Character 15) adjacent to the active layer (see Figure 2, Character 204) and a second surface (see Figure 2, Character 16) opposite to the first surface (see Figure 2, Character 15), the heat spreader (see Figure 2, Character 207) being transparent

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to light of wavelengths in an operating bandwidth of the device (Paragraph [0037]) and, the heat spreader in addition to removing heat from the active layer (see Figure 2, Character 204), is of a shape that provided a selected optical function on light output from the device (see Paragraph [0039]).

Zheng discloses the claimed invention except for second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface. Bewley teaches second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface. However, it is well known in the art to apply the second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface as discloses by Bewley in Figure 8, Column 6, Lines 64 – 67 and Column 7, Lines 1 – 8. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known second surface of the heatspreader is curved or includes a curved structure or is at a non-parallel angle to the first surface as suggested by Bewley to the laser of Zheng, because it the heat sink of the convex type as a heat radiator is exposed to improve the heat radiation property and reliability of the device.

Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng (2003/0039284) in view of in view of Bewley et al (6,448,642) further in view of Raymond et al. (6,393,038)

Regarding claims 8 and 17, Zheng discloses the claimed invention except for second surface of the heatspreader is curved or includes a curved structure. Bewley teaches a second surface of the heatspreader is curved or includes a curved structure. However, it is well known in the art to apply the second surface of the heatspreader is curved or includes a curved structure as discloses by Bewley in Figure 8, Column 6, Lines 64 – 67 and Column 7, Lines 1 – 8. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known second surface of the heatspreader is curved or includes a curved structure as suggested by Bewley to the laser of Zheng, because it the heat sink of the curved structure (e.g. convex type) as a heat radiator is exposed to improve the heat radiation property and reliability of the device.

Zheng discloses the claimed invention except for heat spreader focuses or defocuses intracavity light. Raymond teaches heat spreader focuses or defocuses intracavity light. However, it is well know in the art to apply the heat spreader focuses or defocuses intracavity light as discloses by Raymond in (Column 5, Lines 49 – 53). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known heat spreader focuses or defocuses intracavity light as suggested by Raymond to the laser of Zheng, because could be used a lens to produce the focuses or defocuses intracavity light in the heat spreader see (Column 5, Lines 49 – 53) of Raymond.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng (2003/0039284) in view of Bewley et al (6,448,642) further in view of Yoshida et al (2002/0136254).

Regarding claim 31, Zheng discloses the claimed invention except for amplifier or laser is a Raman amplifier. Yoshida teaches amplifier or laser is a Raman amplifier. However, it is well known in the art to apply the amplifier or laser is a Raman amplifier as disclosed by Yoshida in Paragraphs [0005, 0010]. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was to apply the well known amplifier or laser is a Raman amplifier as suggested by Yoshida to the laser of Zheng, because could be used to construct to amplify any desired wavelength so long as pumping light source can be prepared. Raman gain produced by the pumping light to be stable, thereby preventing associated noise from being modulated onto the input signal see Paragraphs [0005 and 0010] of Yoshida.

Allowable Subject Matter

Claim 24 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 1, 8-10, 12-14 and 16-37 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DELMA R. FORDE whose telephone number is (571)272-1940. The examiner can normally be reached on M-T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/DELMA R. FORDE/
Examiner, Art Unit 2828
December 30, 2009